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RESEARCH NOTE LS-43

LAKE STATES FOREST EXPERIMENT STATION • U.S. DEPARTMENT OF AGRICULTURE

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Minnesota's Timber Volume

Minnesota's timber volume increased nearly 34 million cords between 1953 and 1962 to over 124 million cords (table 1). A wave of young trees in northern Minnesota reaching merchantable size in stands previously classed as "restocking" accounts for much of the 37-percent increase in timber volume. Included in the growing stock are 15.5 billion board feet of sawtimber (table 2). This volume, expanded from 12.5 billion board feet in 1953, reflects both an improved growing stock and a maturing of Minnesota's second-growth forests. Average growing stock volume per acre increased from 5.0 to 7.3 cords; average sawtimber volume per acre changed from 693 to 910 board feet.

The three northeastern survey units contain almost 90 percent of the State's growing stock and nearly 80 percent of its sawtimber volume. In 1953 these figures were 78 percent and 67 percent, respectively. Southern Minnesota has had a decrease in volume. Part of the loss is due to timber harvest and land clearing, although differences in definitions between surveys account for some of the loss. Definition differences had little effect in the north.

Conifers comprised 37 percent of the growing stock volume and 42 percent of the sawtimber volume in 1962. Over nine-tenths of the conifer volume is in northeastern Minnesota.

Aspen, jack pine, and paper birch, in that order, are the most prominent species; they include 47 percent of Minnesota's growing stock volume. Since all three are short-lived, greater harvests seem warranted. Paper birch has moved from the sixth most plentiful species in 1953 to the third in 1962, just ahead of black spruce and balsam fir. Paper birch growing stock volume has almost tripled in St. Louis County and has nearly doubled in Lake and Itasca Counties.

Aspen maintains its lead in sawtimber volume. Red pine, almost doubling in volume, has moved ahead of jack pine as the second-ranked sawtimber species. About 45 percent of the increase in red pine sawtimber volume is in Itasca County.

Both growing stock and sawtimber volumes have accumulated rapidly since 1953 (table 3), especially in the Central Pine Unit where the increase exceeds 60 percent in most counties. The increase was large but less uniform in other northern units. Volumes were reduced as much as 20 to 40 percent in most of the southern and western counties except along the forested edge of the Red River Valley. Much of this apparent reduction is attributed to more rigid specifications for sawtimber trees. Some poor-quality large trees classed as growing stock in 1953 are now classed as culls.

These statistics are based on results from the cooperative Forest Survey conducted during 1960-63 by the Lake States Forest Experiment Station, the Iron Range Resources and Rehabilitation Commission, and several other cooperators. This is the second of a number of reports being prepared to make forest resource statistics available to the public. The first was Research Note LS-25, "Forest Area Trends in Minnesota Counties," July 1963.

Sampling error (at one standard deviation) is estimated to be ±0.6 percent for the growing stock volume in the State. This approximates ±7 percent error per million cords or ±22 percent error per 100,000 cords. The percent error figure doubles as the volume is divided by 4. Sampling error is somewhat lower than this in the north, where sampling was more intensive than in the south.

APRIL 1964

PAUL S. DeBALD,
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MAINTAINED AT ST. PAUL 1, MINNESOTA, IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA

Table 1.--Growing stock[1] volumes in Minnesota counties, 1962

(Thousands of cords)[2]

County	All species	All conifers	All hardwoods	White & red pine	Jack pine	Spruce	Balsam fir	Tamarack & cedar	Elm, ash, & basswood	Oaks	Aspen	Paper birch	Other hardwoods
LAKE SUPERIOR UNIT													
Carlton	1,420.3	364.1	1,056.2	51.7	60.4	60.3	126.7	65.0	277.4	60.3	397.1	205.6	115.8
Cook	7,132.3	3,865.3	3,267.0	344.7	694.0	1,565.1	861.2	400.3	97.2	2.1	2,056.6	906.0	205.1
Lake	9,596.7	4,813.2	4,783.5	445.4	1,049.2	1,443.8	1,144.9	729.9	250.1	5.5	2,489.8	1,438.0	600.1
Pine	1,481.2	144.9	1,336.3	7.1	77.0	37.7	4.6	18.5	420.6	107.8	601.6	124.2	82.1
St. Louis	25,163.7	11,625.7	13,538.0	1,966.7	3,988.3	2,359.5	2,387.5	923.7	1,161.2	23.2	8,702.3	2,370.1	1,281.2
Total	44,794.2	20,813.2	23,981.0	2,815.6	5,868.9	5,466.4	4,524.9	2,137.4	2,206.5	198.9	14,247.4	5,043.9	2,284.3
RAINY RIVER UNIT													
Koochiching	14,271.0	7,924.0	6,347.0	406.1	270.6	3,858.0	1,478.2	1,911.1	981.2	13.4	3,745.1	620.9	986.4
Lake of the Woods	2,773.2	1,704.5	1,068.7	103.6	177.3	643.6	394.4	385.6	271.2	38.6	499.9	39.6	219.4
Total	17,044.2	9,628.5	7,415.7	509.7	447.9	4,501.6	1,872.6	2,296.7	1,252.4	52.0	4,245.0	660.5	1,205.8
CENTRAL PINE UNIT													
Aitkin	5,541.8	1,202.2	4,339.6	184.9	55.5	218.1	228.6	515.1	1,085.8	538.7	1,432.3	469.2	813.6
Becker	3,136.8	632.0	2,504.8	205.9	218.1	51.5	112.8	43.7	556.5	434.1	1,136.6	188.7	188.9
Beltrami	6,066.4	2,089.1	3,977.3	296.8	380.8	350.8	317.6	743.1	860.0	128.5	1,966.9	405.3	616.6
Cass	7,444.7	2,436.5	5,008.2	898.2	821.8	100.8	348.8	266.9	566.1	603.6	2,793.0	652.5	393.0
Clearwater	2,760.5	418.2	2,342.3	145.4	98.7	59.3	43.7	71.1	509.2	198.7	1,254.8	216.7	162.9
Crow Wing	4,101.0	926.5	3,174.5	346.7	436.7	16.9	54.3	71.9	567.2	784.1	1,468.1	271.3	83.8
Hubbard	3,040.4	1,047.0	1,993.4	217.8	645.8	103.0	31.2	49.2	76.9	220.8	1,418.1	205.4	72.2
Itasca	13,752.1	5,018.8	8,733.3	1,115.0	852.1	944.5	1,378.0	729.2	1,406.0	284.5	5,138.7	1,120.3	783.8
Wadena	512.2	316.1	196.1	52.6	227.4	17.3	4.5	14.3	37.2	45.9	80.0	16.8	16.2
Total	46,355.9	14,086.4	32,269.5	3,463.2	3,736.9	1,862.2	2,519.5	2,504.5	5,664.9	3,238.9	16,688.5	3,546.2	3,131.0
SOUTHEAST UNIT													
Anoka	289.3	49.8	239.5	1.5	-	-	-	48.3	82.0	82.6	34.5	14.9	25.5
Benton	127.1	2.6	124.5	1.1	-	-	-	1.5	44.2	44.6	11.4	7.7	16.6
Carver	138.1	1.1	137.0	.6	-	-	-	.5	60.5	37.8	8.0	2.8	27.9
Chisago	245.9	18.3	227.6	.6	-	-	-	17.7	92.2	65.5	16.6	9.8	43.5
Dakota	151.0	2.1	148.9	.6	-	-	-	1.5	46.6	60.1	12.7	6.7	22.8
Douglas	212.1	2.7	209.4	-	-	-	-	2.7	89.5	46.4	24.3	7.5	41.7
Fillmore	559.4	3.8	555.6	2.1	-	-	-	1.7	174.6	248.5	34.6	12.2	85.7
Goodhue	421.3	2.6	418.7	-	1.0	-	-	1.6	133.6	180.2	26.7	10.6	67.6
Hennepin	159.1	1.3	157.8	.7	-	-	-	.6	65.5	47.8	7.1	4.0	33.4
Houston	756.7	4.5	752.2	2.7	-	-	-	1.8	186.5	395.3	49.8	17.3	103.3
Isanti	230.0	16.3	213.7	.8	-	-	-	15.5	75.5	78.2	20.9	10.7	28.4
Kanabec	619.0	11.6	607.4	2.7	-	.5	-	8.4	139.2	147.3	258.7	35.8	26.4
Le Sueur	193.3	.5	192.8	-	-	-	-	.5	96.5	44.2	5.9	3.6	42.6
Mille Lacs	551.2	34.1	517.1	5.4	-	3.9	-	24.8	192.1	115.1	156.5	27.4	26.0
Morrison	746.2	90.9	655.3	4.8	63.9	3.9	-	18.3	245.8	164.1	178.3	36.2	30.9
Olmsted	317.2	1.3	315.9	.6	-	-	-	.7	72.6	167.9	26.6	8.9	39.9
Otter Tail	1,029.1	97.5	931.6	10.5	17.1	4.0	-	65.9	370.3	211.6	260.0	50.3	39.4
Ramsey	19.0	-	19.0	-	-	-	-	-	7.0	6.2	1.1	.5	4.2
Rice	123.3	-	123.3	-	-	-	-	-	52.4	35.6	6.8	2.2	26.3
Scott	128.5	.5	128.0	-	-	-	-	.5	54.3	36.2	7.9	2.6	27.0
Sherburne	162.6	9.9	152.7	1.8	-	-	-	8.1	36.5	75.4	14.8	7.3	18.7
Stearns	383.4	5.0	378.4	1.6	-	-	-	3.4	126.3	145.0	34.1	15.6	57.4
Todd	606.5	54.5	552.0	6.3	27.9	2.6	-	17.7	202.9	146.5	148.9	31.9	21.8
Wabasha	310.2	2.7	307.5	.7	-	-	-	2.0	90.5	137.8	20.1	9.0	50.1
Washington	152.5	1.8	150.7	.7	-	-	-	1.1	65.0	41.9	9.6	4.4	29.8
Winona	600.8	7.8	593.0	5.6	-	-	-	2.2	150.6	302.7	41.1	16.7	81.9
Wright	258.0	1.5	256.5	-	-	-	-	1.5	108.4	70.9	14.4	4.8	58.0
Total	9,490.8	424.7	9,066.1	51.4	109.9	14.9	-	248.5	3,061.1	3,135.4	1,431.4	361.4	1,076.8
WESTERN UNIT													
Clay	60.0	-	60.0	-	-	-	-	-	25.5	14.9	13.9	.2	5.5
Kittson	237.8	-	237.8	-	-	-	-	-	22.1	19.5	154.3	1.7	40.2
Mahnomen	1,184.3	89.6	1,094.7	26.3	26.5	5.1	25.5	6.2	240.6	128.3	582.4	70.2	73.2
Marshall	363.5	29.5	334.0	-	-	-	-	29.5	34.6	31.7	209.0	2.3	56.4
Norman	106.5	-	106.5	-	-	-	-	-	48.2	21.1	29.6	.3	7.3
Pennington	93.2	-	93.2	-	-	-	-	-	17.2	12.9	46.3	.6	16.2
Polk	216.2	7.7	208.5	-	-	-	-	7.7	40.3	24.7	108.4	1.2	33.9
Red Lake	132.9	-	132.9	-	-	-	-	-	29.0	15.5	70.6	.7	17.1
Roseau	1,448.2	560.2	888.0	86.7	134.5	110.3	117.9	110.8	157.3	41.7	371.3	38.6	279.1
Southwest 3/ counties	2,545.8	21.8	2,524.0	-	-	-	-	21.8	1,750.3	386.7	6.5	-	380.5
Total	6,388.4	708.8	5,679.6	113.0	161.0	115.4	143.4	176.0	2,365.1	697.0	1,592.3	115.8	909.4
State total	124,073.5	45,661.6	78,411.9	6,953.0	10,324.6	11,960.5	9,060.4	7,363.1	14,550.0	7,322.2	38,204.6	9,727.8	8,607.3

1/ Net volume of live merchantable sawtimber and poletimber trees from the stump to a variable 4-inch top diameter outside bark of the central stem. Does not include limbs or cull tree volume.

2/ Standard cord equals 79 cubic feet of solid wood.

3/ Includes: Big Stone, Blue Earth, Brown, Chippewa, Cottonwood, Dodge, Faribault, Freeborn, Grant, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, McLeod, Martin, Meeker, Mower, Murray, Nicollet, Nobles, Pipestone, Pope, Redwood, Renville, Rock, Sibley, Steele, Stevens, Swift, Traverse, Waseca, Wantonwan, Wilkin, and Yellow Medicine Counties.

Table 2.--Sawtimber volumes [1/] in Minnesota counties, 1962

(Million board feet) [2/]

County	All species	All conifers	All hardwoods	White and red pine	Jack pine	Other conifers	Sug.maple and yel.birch	Basswood	Ash and elm	Red oaks	White oaks	Aspen and paper bir.	Other hardwoods
LAKE SUPERIOR UNIT													
Carlton	118.8	40.1	78.7	19.2	12.0	8.9	15.1	7.9	31.8	8.2	1.7	11.1	2.9
Cook	839.7	511.1	328.6	100.6	108.9	301.6	27.1	4.6	10.5	-	0.2	281.6	4.6
Lake	899.5	476.3	423.2	115.7	146.3	214.3	22.5	25.4	26.6	2.6	0.2	308.8	37.1
Pine	174.5	25.5	149.0	1.9	19.5	4.1	13.8	18.5	88.7	8.1	2.2	17.7	-
St. Louis	2,385.6	1,534.5	851.1	597.2	500.7	436.6	33.4	35.7	185.0	1.4	0.9	454.1	140.6
Total	4,418.1	2,587.5	1,830.6	834.6	787.4	965.5	111.9	92.1	342.6	20.3	5.2	1,073.3	185.2
RAINY RIVER UNIT													
Koochiching	1,307.0	729.7	577.3	144.5	25.0	560.2	1.0	54.9	118.9	-	4.1	306.7	91.7
Lake of the Woods	239.4	151.1	88.3	34.6	14.3	102.2	0.1	10.0	17.0	-	1.3	44.6	15.3
Total	1,546.4	880.8	665.6	179.1	39.3	662.4	1.1	64.9	135.9	-	5.4	351.3	107.0
CENTRAL PINE UNIT													
Aitkin	828.0	176.2	651.8	57.8	12.3	106.1	143.5	59.2	131.0	64.6	53.1	107.4	93.0
Becker	395.9	155.2	240.7	89.4	49.4	16.4	5.4	45.7	66.5	34.4	23.7	58.0	7.0
Beltrami	685.1	254.9	430.2	112.2	35.1	107.6	21.4	57.5	115.5	12.2	8.7	163.8	51.1
Cass	772.3	466.2	306.1	309.8	117.6	38.8	40.7	37.3	24.0	49.8	10.6	137.8	5.9
Clearwater	332.4	106.3	226.1	57.3	36.2	12.8	3.6	29.5	72.6	4.8	10.1	78.3	27.2
Crow Wing	438.4	187.3	251.1	101.9	65.6	19.8	6.0	33.3	40.9	55.6	25.5	76.3	13.5
Hubbard	275.1	182.1	93.0	83.5	87.2	11.4	1.6	1.1	8.0	15.7	5.8	60.1	0.7
Itasca	2,252.7	1,313.8	938.9	664.4	230.8	418.6	76.3	100.7	116.0	10.6	62.2	511.8	61.3
Wadena	55.8	36.4	19.4	12.2	21.6	2.6	0.1	1.0	6.7	6.7	1.2	3.1	0.6
Total	6,035.7	2,878.4	3,157.3	1,488.5	655.8	734.1	298.6	365.3	581.2	254.4	200.9	1,196.6	260.3
SOUTHEAST UNIT													
Anoka	48.2	3.5	44.7	-	-	3.5	2.8	8.0	8.7	13.2	4.7	3.3	4.0
Benton	30.5	-	30.5	-	-	-	1.4	5.4	6.7	8.1	3.5	2.1	3.3
Carver	45.2	-	45.2	-	-	-	4.1	9.7	12.5	8.9	4.0	1.6	4.4
Chisago	67.8	1.4	66.4	-	-	1.4	5.4	12.7	19.7	12.8	5.8	2.1	7.9
Dakota	44.7	-	44.7	-	-	-	1.6	6.0	10.3	12.8	5.9	3.0	5.1
Douglas	58.1	-	58.1	-	-	-	4.7	11.5	18.6	8.8	4.4	2.2	7.9
Fillmore	173.8	-	173.8	-	-	-	8.5	26.3	35.6	52.4	24.5	9.4	17.1
Goodhue	134.0	-	134.0	-	-	-	7.1	20.3	27.9	40.2	18.4	7.1	13.0
Hennepin	56.7	-	56.7	-	-	-	3.8	9.7	16.3	12.1	6.0	1.8	7.0
Houston	241.0	-	241.0	-	-	-	8.7	29.1	39.5	87.9	41.9	12.6	21.3
Isanti	54.2	1.1	53.1	-	-	1.1	3.6	10.5	11.4	13.9	6.5	2.5	4.7
Kanebec	38.0	1.7	36.3	1.7	-	-	0.6	1.3	12.6	7.3	4.0	8.6	1.9
Le Sueur	70.5	-	70.5	-	-	-	6.6	15.9	21.4	11.7	5.3	1.8	7.8
Mille Lacs	61.4	5.4	56.0	2.4	-	3.0	0.1	6.6	27.0	9.6	5.1	4.4	3.2
Morrison	102.0	27.5	74.5	2.0	22.7	2.8	0.3	10.3	33.9	13.6	7.3	5.8	3.3
Olmsted	96.4	-	96.4	-	-	-	3.0	10.3	15.8	34.9	16.3	7.5	8.6
Otter Tail	125.2	16.2	109.0	5.9	6.1	4.2	0.3	17.0	47.8	22.2	9.3	7.2	5.2
Ramsey	11.6	-	11.6	-	-	-	0.5	1.4	2.5	3.5	1.6	0.8	1.3
Rice	44.3	-	44.3	-	-	-	3.6	8.9	12.7	8.6	4.2	1.4	4.9
Scott	43.4	-	43.4	-	-	-	3.9	8.6	12.0	8.4	4.0	2.0	4.5
Sherburne	40.9	0.6	40.3	-	-	0.6	1.4	5.0	7.0	14.3	6.6	2.2	3.8
Stearns	105.1	0.3	104.8	-	-	0.3	5.8	17.4	23.7	28.5	13.5	5.3	10.6
Todd	81.7	16.0	65.7	3.6	9.9	2.5	-	8.6	28.7	15.5	5.7	4.2	3.0
Wabasha	95.2	-	95.2	-	-	-	4.1	12.3	20.2	29.1	14.0	5.0	10.5
Washington	47.8	-	47.8	-	-	-	4.6	9.6	13.0	9.6	4.4	1.8	4.8
Winona	181.7	-	181.7	-	-	-	6.7	21.3	29.7	66.5	31.2	10.1	16.2
Wright	91.5	-	91.5	-	-	-	7.3	15.8	25.9	18.4	8.8	4.5	10.8
Total	2,190.9	73.7	2,117.2	15.6	38.7	19.4	100.5	319.5	541.1	572.8	266.9	120.3	196.1
WESTERN UNIT													
Clay	14.3	-	14.3	-	-	-	-	2.8	2.6	-	6.9	1.5	0.5
Kittson	14.0	-	14.0	-	-	-	-	2.6	2.6	-	2.4	5.6	0.8
Mahnomen	106.9	26.7	80.2	12.3	8.0	6.4	0.6	12.8	16.2	3.3	8.4	27.8	11.1
Marshall	26.7	5.7	21.0	-	-	5.7	-	3.8	2.9	-	4.7	8.1	1.5
Norman	23.7	-	23.7	-	-	-	-	5.4	6.0	-	9.0	2.7	0.6
Pennington	10.0	-	10.0	-	-	-	-	1.9	1.2	-	3.8	2.2	0.9
Polk	23.4	1.5	21.9	-	-	1.5	-	4.2	4.4	-	6.6	5.0	1.7
Red Lake	14.4	-	14.4	-	-	-	-	2.9	3.5	-	4.0	3.4	0.6
Roseau	180.8	105.2	75.6	51.8	31.0	22.4	-	-	16.2	-	2.7	38.3	18.4
Southwest 3/ counties	913.6	-	913.6	-	-	-	32.5	162.3	501.4	36.9	71.9	-	108.6
Total	1,327.8	139.1	1,188.7	64.1	39.0	36.0	33.1	198.7	557.0	40.2	120.4	94.6	144.7
State total	15,518.9	6,559.5	8,959.4	2,581.9	1,560.2	2,417.4	545.2	1,040.5	2,157.8	887.7	598.8	2,836.1	893.3

1/ Net volume of live merchantable sawtimber trees (conifers 9.0 inches d.b.h. or larger and hardwoods 11.0 inches d.b.h. and larger) from the stump to a point in the central stem at which utilization for sawn products is limited by large branches, forks, or other defects, or by a diameter outside bark of 8.0 inches.

2/ International log rule, 1/4-inch kerf.

3/ See footnote 3/for table 1.

Table 3.--Changes in volumes in Minnesota counties by percent classes,[1/] 1953-1962

Counties	Percent change in growing stock volume	Percent change in sawtimber volume
LAKE SUPERIOR UNIT		
Carlton	+40 to 60	+40 to 60
Cook	+20 to 40	- 1 to 20
Lake	+40 to 60	- 1 to 20
Pine	+ 1 to 20	+ 1 to 20
St. Louis	60+	+40 to 60
Total	+40 to 60	+ 1 to 20
RAINY RIVER UNIT		
Koochiching	60+	60+
Lake of the Woods	+ 1 to 20	+ 1 to 20
Total	60+	+40 to 60
CENTRAL PINE UNIT		
Aitkin	60+	60+
Becker	60+	60+
Beltrami	+40 to 60	+40 to 60
Cass	+40 to 60	- 1 to 20
Clearwater	+20 to 40	60+
Crow Wing	60+	60+
Hubbard	60+	60+
Itasca	60+	60+
Wadena	+20 to 40	+40 to 60
Total	60+	60+
SOUTHEASTERN UNIT[2/]		
Total	-20 to 40	-20 to 40
WESTERN UNIT[2/]		
Total	+ 1 to 20	+ 1 to 20
State total	+20 to 40	+20 to 40

1/ Twenty-percent classes are used to indicate relative changes, since sampling errors preclude the use of direct comparisons for county volumes.

2/ Because of sampling errors, small volumes, and definition differences, comparisons in volume for individual counties in the Southeastern Unit and the Western Unit (which includes the Red River Valley and the southwestern counties) are not statistically meaningful.